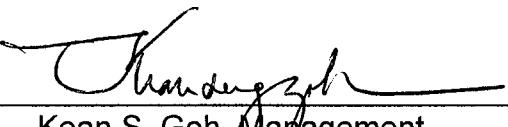


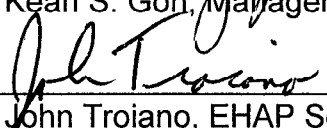
STANDARD OPERATING PROCEDURE
Sampling for Surface Water Runoff in Agricultural Fields

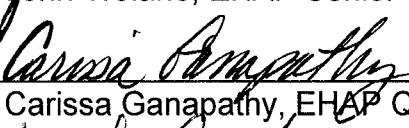
KEY WORDS

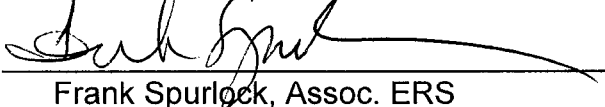
Surface water, tail water, agricultural runoff, field runoff, overland flow

APPROVALS

APPROVED BY:  DATE: 1/14/1999
Kean S. Goh, Management

APPROVED BY:  DATE: 1/9/99
John Troiano, EHAP Senior Scientist

APPROVED BY:  DATE: 1/8/99
Carissa Ganapathy, EHAP Quality Assurance Officer

PREPARED BY:  DATE: 1/9/99
Frank Spurlock, Assoc. ERS

Environmental Hazards Assessment Program (EHAP) organization and personnel such as management, senior scientist, quality assurance officer, project leader, etc. are defined and discussed in SOP ADMN002.

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Sampling for Surface Water Runoff in Agricultural Fields

1 .0 INTRODUCTION

1 .1 Purpose

This Standard Operating Procedure (SOP) discusses general procedures for sampling surface or overland water runoff in agricultural fields arising from irrigation, rainfall, or simulated rainfall events. Runoff studies may be conducted under a broad range of crop types, field cultivation regimes, and water application methods. Therefore, this SOP is general in nature, and outlines considerations for study specific decisions.

2.0 PROCEDURES

2.1 General

Runoff studies are usually conducted for the purpose of (1) determining the total mass of pesticide leaving a field in rain runoff or irrigation tailwater, (2) estimating average concentration over time during a runoff event, or (3) evaluating peak concentrations in runoff water during a runoff event. While the former objectives require concomitant experimental drain water flow measurements, the latter objective can usually be satisfied by sampling at the proper time. Because study objectives are critical, they should be clearly stated in the study protocol so that study methods and sampling procedures may be designed accordingly.

2.2 Sampling Site Location

Sampling locations will be specific to the experimental plot and the study objectives. Sampling locations may include, but are not limited to furrows, furrow ends, drain culverts, entry points of drainage into ditches, drainage ditches, or larger drainage canals. Sampling site locations should be chosen so that they are consistent with EHAP Quality Assurance Objectives.

2.3 Sampling methods

Several methods of runoff water sampling are possible. The following list is not all-inclusive.

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2.3.1 Sampling of entire volume of runoff. This approach has been used by EHAP in small plot orchard experiments under limited duration simulated rainfall events to evaluate chemical movement from orchard row middles. Furrows were lined with plastic along the length of the plot, and all runoff water was diverted to large buried containers at the end of the plot. One benefit is that the entire runoff volume and average concentrations are measured directly.

2.3.2 Grab sampling directly from drainage flow. This method is appropriate for sampling concentrations at a single point in time from small, relatively uniform flows. A typical application is sampling of rice drain waters directly from check drain culverts during the initial drain period.

2.3.3 Time integrated sampling. This type of sampling is useful for evaluating average concentrations during extended runoff events, where samples are taken periodically and composited to yield average concentration over the duration of sampling. Autosamplers are frequently used for time integrated sampling. To determine average runoff concentrations or total mass load leaving an experimental unit, concomitant flow measurements (discussed below) during the sampling period are also required.

2.3.4 Depth and width integrated sampling across larger streams or ditches. When samples are taken from large drainage flows, such as in ditches, it may be necessary to obtain spatially integrated samples across a perpendicular transect of the ditch. Previous EHAP studies have used specially designed submersible constant intake samplers to obtain such samples.

2.4 Splitting Samples.

In cases where multiple samples must be combined to obtain uniform replicate samples, splitting should be conducted in accordance with EHAP SOP FSWAO04.

2.5 Flow Measurement

Several methods are available to measure flow in water courses depending on the size of the water body and rate of flow. These include various configurations of flumes, weirs, and water current meters. Flow measurements should be taken at the time of sampling.

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2.6 Filtration

Samples may be analyzed for dissolved and sediment bound pesticide, or total pesticide depending on study objectives. If it is desirable to discriminate between dissolved and sediment-bound pesticide, filtration may be used to separate sediment from water for subsequent analysis. A typical range for nominal filter pore size is 0.45 to 1 .O µM. The choice of filter size and material should be made in consultation with the EHAP Laboratory Liaison or the analytical laboratory staff.

3.0 REPORTING REQUIREMENTS

3.1 Chain of Custody

A chain of custody form should be completed for each sample according to SOP ADMN006. The following information should be recorded on the chain of custody

3.1.1 Study number

3.1.2 Sample number - Include sample number and numbers of all backup, field blank, and primary samples taken at the same site.

3.1.3 Sample location

3.1.4 Date and time of sampling

3.1.5 Sampling personnel

3.1.6 Name of field or experimental plot

3.2 Ancillary Information

Other ancillary information should be recorded or included in the experimental notebook, including a map of the sampling location(s) in relationship to field layout, field soil type, weather conditions, duration of runoff, duration of water application, type of water application, and water application rate or total water application.

4.0 STUDY-SPECIFIC DECISIONS

The following study specific decisions are the responsibility of the study project leader, and should be made in consultation with the study field coordinator, senior scientists, and the EHAP Quality Assurance Officer or Lab Liaison.

4.0.1 Sampling location

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4.0.2 Sampling method

4.0.3 Flow measurement and method

4.0.4 Filtration, filter size, filter material